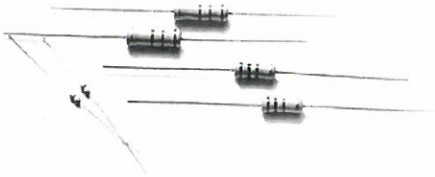


INTRODUCTION

The CFR Series Carbon Film Resistors are manufactured by coating a homogeneous film of pure carbon on high grade ceramic rods. After a helical groove has been cut in the resistive layer, tinned connecting leads of electrolytic copper are welded to the end-caps. The resistors are coated with layers of tan color lacquer.

FEATURES

Power Rating	1/6W, 1/4W, 1/2W, 1W, 2W, 3W
Resistance Tolerance	±2%, ±5%
T.C.R.	see Table 1

DERATING CURVE

For resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below.

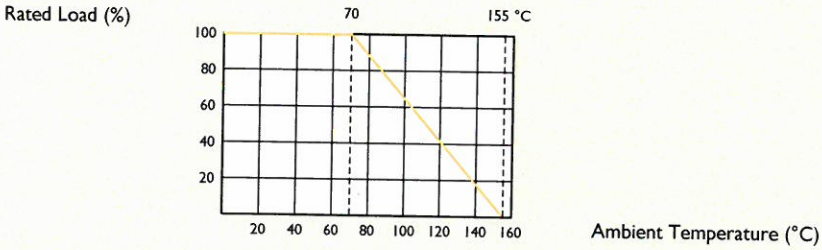
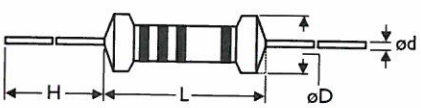


TABLE 1 TEMPERATURE COEFFICIENT

STYLE	TEMP. COEFFICIENT (ppm/°C)		
	under 100KΩ	100K Ω - 1MΩ	1MΩ - 10MΩ
CFR100, CFR200, CFR2WS, CFR3WS	-350~350	-500~0	-1,500~0
CFR-12, CFR-25, CFR-50, CFR25S, CFR50S, CFR1WS	-350~500	-700~0	-1,500~0

DIMENSIONS

Unit: mm



STYLE		DIMENSION			
Normal	Miniature	L	øD	H	ød
CFR-12	CFR25S	3.4±0.3	1.9±0.2	28±2.0	0.45±0.05
CFR-25	CFR50S	6.3±0.5	2.4±0.2	28±2.0	0.55±0.05
CFR-50	CFR1WS	9.0±0.5	3.3±0.3	26±2.0	0.55±0.05
CFR100	CFR2WS	11.5±1.0	4.5±0.5	35±2.0	0.8±0.05
CFR200	CFR3WS	15.5±1.0	5.0±0.5	33±2.0	0.8±0.05

Note:

ELECTRICAL CHARACTERISTICS

STYLE	CFR-12	CFR25S	CFR-25	CFR50S	CFR-50	CFR1WS	CFR100	CFR2WS	CFR200	CFR3WS
Power Rating at 70°C	1/6W	1/4W		1/2W		1W		2W		3W
Maximum Working Voltage	150V	200V	250V	300V	350V	400V	500V			
Maximum Overload Voltage	300V	400V	500V	600V	700V	800V	1,000V			
Voltage Proof on Insulation	300V	400V	500V			700V	1,000V			
Resistance Range	1Ω - 10MΩ & 0Ω for E24 series value									
Operating Temp. Range	-55°C to +155°C									
Temperature Coefficient	see Table 1									

Note: Special value is available on request

ENVIRONMENTAL CHARACTERISTICS

PERFORMANCE TEST	TEST METHOD		APPRAISE
Short Time Overload	IEC 60115-1 4.13	2.5 times RCWV for 5 Sec.	±0.75%+0.05Ω
Voltage Proof on Insulation	IEC 60115-1 4.7	in V-block for 60 Sec., test voltage by type	By type
Temperature Coefficient	IEC 60115-1 4.8	-55°C to +155°C	By type
Insulation Resistance	IEC 60115-1 4.6	in V-block for 60 Sec.	>1,000MΩ
Solderability	IEC 60115-1 4.17	235±5°C for 3±0.5 Sec.	95% Min. coverage
Solvent Resistance of Marking	IEC 60115-1 4.30	IPA for 5±0.5 Min. with ultrasonic	No deterioration of coatings and markings
Robustness of Terminations	IEC 60115-1 4.16	Direct load for 10 Sec. in the direction of the terminal leads	≥2.5kg (24.5N)
Periodic-pulse Overload	IEC 60115-1 4.39	4 times RCWV 10,000 cycles (1 Sec. on, 25 Sec. off)	±1.0%+0.05Ω
Damp Heat Steady State	IEC 60115-1 4.24	40±2°C, 90-95% RH for 56 days, loaded with 0.1 times RCWV	±3.0%+0.05Ω
Endurance at 70°C	IEC 60115-1 4.25	70±2°C at RCWV for 1,000 Hr. (1.5 Hr. on, 0.5 Hr. off)	±3.0%+0.05Ω
Temperature Cycling	IEC 60115-1 4.19	-55°C ⇨ Room Temp. ⇨ +155°C ⇨ Room Temp. (5 cycles)	±1.0%+0.05Ω
Resistance to Soldering Heat	IEC 60115-1 4.18	260±3°C for 10±1 Sec., immersed to a point 3±0.5mm from the body	±1.0%+0.05Ω

Note: RCWV(Rated Continuous Working Voltage) = $\sqrt{\text{Power Rating} \times \text{Resistance Value}}$ or Max. working voltage listed above, whichever less.

EXPLANATIONS OF ORDERING CODE

MFR	-12	F	T	F	52-	100R

Code 1 - 3
Series Name
See Index

Code 4 - 6
Power Rating

-05 = ød0.5mm
-06 = ød0.6mm
-07 = ød0.7mm
-08 = ød0.8mm
-10 = ød1.0mm
-14 = ød1.4mm
-12 = 1/6W
-25 = 1/4W
25S = 1/4WS
-50 = 1/2W
50S = 1/2WS
100 = 1W
1WS = 1WS
200 = 2W
2WS = 2WS
204 = 0.4W
207 = 0.6W
300 = 3W
3WS = 3WS
3WM = 3WM
400 = 4W
500 = 5W
5WS = 5WS
5SS = 5WSS
700 = 7W
7WS = 7WS
10A = 10W
20A = 20W
30A = 30W
40A = 40W
50A = 50W
10S = 10WS
15A = 15W
25A = 25W
10B = 100W
25B = 250W

Code 7
Tolerance

P = ±0.02 %
A = ±0.05 %
B = ±0.1 %
C = ±0.25%
D = ±0.5 %
F = ±1 %
G = ±2 %
J = ±5 %
K = ±10 %
- = Base on Spec.

Code 8
Packing Style

T = Tape/Box
R = Tape/Reel
B = Bulk

Code 9
Temperature Coefficient of Resistance

- = Base on Spec.
A = ±5 ppm/°C
B = ±10 ppm/°C
C = ±15 ppm/°C
S = ± 20ppm/°C
D = ±25 ppm/°C
E = ±50 ppm/°C
F = ±100 ppm/°C
G = ±200 ppm/°C
H = ±250 ppm/°C
I = ±300 ppm/°C
J = ±350 ppm/°C

Code 10 - 12
Forming Type

26- = 26mm
52- = 52.4mm
73- = 73mm
81- = 81mm
91- = 91mm
F = F Type
FK = FK Type
FKK = FKK Type
FFK = F-form Kink
M = M-Type Forming
MB = M-form W/flat
MT = MT Type Forming
MR = MR Type
AV = AVIsert
PN = PANAsert

Code 13 - 17
Resistance Value

0R1 = 0.1
100R = 100
10K = 10,000
10M = 10,000,000

EXCEPTION:

• Cement series:

<Code 8>: Special packing style code
B: Bulk with wirewound or metal oxide sub-assembly for resistance value
W: Bulk with ceramic based wirewound sub-assembly for resistance value
M: Bulk with metal oxide sub-assembly for resistance value
F: Bulk with Fiberglass based wirewound sub-assembly for resistance value

<Code 10-12>: Without forming code

Example: **SQP500JB-10R**

• JPW series:

<Code 13-17>: without resistance value code

Example: **JPW-06-T-52-**